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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MICHAEL WILLIAMS
and MICHAEL BARTHMAN

Appeal 2008-4421
Application 09/942,330
Technology Center 1700

Decided:[1] March 31, 2009

Before CHARLES F. WARREN, PETER F. KRATZ, and
CATHERINE Q. TIMM, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

I. STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1-14 and 21-24. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Chemical reactions occurring during the etching of the surface of semiconductors can release various gaseous by-products into the etch reactor (Spec. 1:10-21). Typically, a device such as a wet scrubber is used to remove the gaseous by-products (Spec. 1:21-22). The problem is that some gaseous by-products contained in the effluent can precipitate out in the pipes prior to reaching the wet scrubber and obstruct the pipes (Spec. 2:2-5). Moreover, the effluent can corrode the stainless steel components of the scrubber (Spec. 2:10-12). Appellants claim an apparatus for abating effluent, i.e., an apparatus for removing such gaseous by-products (Spec. 1:5-7). Claim 1 is illustrative:

1. A process effluent abatement arrangement, comprising:

an enclosure which defines an interior void;

a first partition having a first orifice defined therein, said first partition being positioned within said interior void such that (i) said first partition divides said interior void into a first chamber and a second chamber and (ii) said first orifice is in fluid communication with said first chamber and said second chamber;

a gas connector which has (i) a passageway defined therethrough and (ii) a gas port in fluid communication with said passageway, said passageway (A) having an inlet and an outlet and (B) being in direct fluid communication with said first chamber of said enclosure, said gas port being downstream of said inlet and upstream of said outlet;

a gas dispenser in direct fluid communication with said second chamber of said enclosure; and

an exit port in fluid communication with said interior void.

The Examiner maintains, and Appellants request review of, the following rejections under 35 U.S.C. § 103(a):

A. The rejection of claims 1-6, 8, 10, and 21-24 as unpatentable over Notman (US 4,311,671, issued Jan. 19, 1982) in view of Posa (US 4,747,367, issued May 31, 1988);
B. The rejection of claims 7 and 11 over Mundt (US 5,137,701, issued Aug. 11, 1992) in view of Notman and Posa;
C. The rejection of claim 9 over Notman, Posa and further in view of McGinness (US 5,384,051, issued Jan. 24, 1995); and
D. The rejection of claims 12-14 over Notman, Posa, Mundt, and McGinness.

II. DISPOSTIVE ISSUES

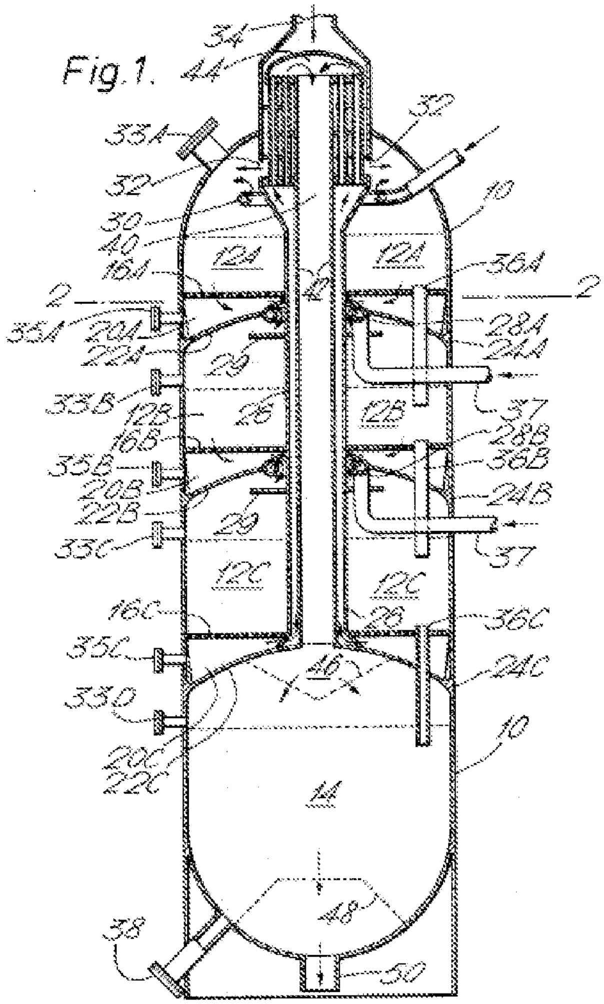
There are three independent claims (claims 1, 11, and 22), and each is subject to a different contention by Appellants. The issues arising are:

1) Did the Examiner reversibly err in rejecting claim 1 by failing to provide an adequate reason for replacing the gas connector (conduit 34) of Notman with the manifold assembly (222) of Posa;
2) Did the Examiner reversibly err in finding that Notman describes a “first orifice” that has the structure required by claim 22; and
3) Did the Examiner reversibly err in rejecting claim 11 by failing to provide a legally sufficient reason for incorporating the synthesis reactor of Notman into the apparatus of Mundt?

IV. FINDINGS OF FACT

Notman describes a synthesis reactor for conducting exothermic catalytic gas-phase reactions such as ammonia or methanol synthesis reactions (Notman, col. 1, ll. 4-6).

Figures 1 and 3 of Notman are reproduced below:



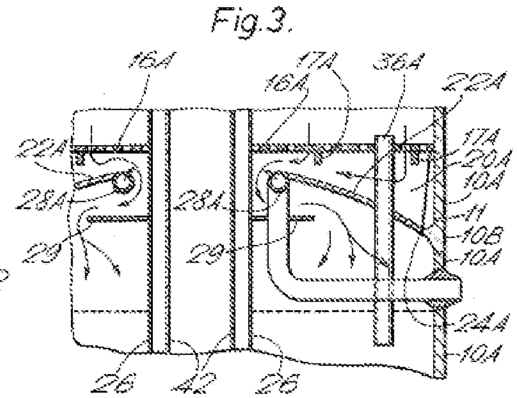


Figure 1 is a sectional elevation of a "hot wall" synthesis reactor vessel described by Notman (Notman, col. 6, l. 50). Figure 3 is an enlarged section plan showing the gas flow path between the catalyst beds of Figure 1 (Notman, col. 6, ll. 52-54).

The reactor shown in Figure 1 contains three small catalyst beds 12A, 12B, and 12C and a large catalyst bed 14 (Notman, col. 6, ll. 59-60). Each small bed is supported on flat grids 16A, 16B, and 16C respectively and charged with particulate catalyst up to the level shown by the dotted lines (Notman, col. 6, ll. 61-64).

Notman splits the synthesis gas into four lines and inputs it through a main gas inlet at the top (34) and through spargers 30, 28A, and 28B (Notman, col. 8, ll. 41-44; Fig. 4). The gas entering through main gas inlet 34 is heated to slightly above catalyst inlet temperature in the space surrounding the tubes of heat exchanger 40 (Notman, col. 8, ll. 25-29). The gas then exits feed holes 32 and its temperature is regulated by colder gas exiting sparger 30 (Notman, col. 8, ll. 27-29; Fig. 1). From there, the gas proceeds through catalyst bed 12A and is heated by the exothermic reaction in the bed (Notman, col. 8, ll. 29-30). As shown in Figure 3, the gas then travels through plate 16A and into the annular gap between sparger 28A and pipe 26 where it is cooled by the colder gas exiting the sparger (Notman, col. 7, ll. 4-9; col. 8, ll. 17-22; Fig. 3).[2] The gas then proceeds through the other small catalyst beds, through plate 16C, upwards through the annular space between tubes 26 and 42 to heat exchanger 40 where it is cooled and to catalyst bed 14 whether it undergoes further reaction and leaves through exit 50 (Notman, col. 8, ll. 31-38; col. 7, ll. 32-39; Fig. 1).

Posa describes a gas mixing manifold that directs gas from a number of different sources into the chamber of a chemical vapor deposition process

[2] It is clear that “sparger 36” as used in column 8, line 20 is intended to read “sparger 28A” as column 7, line clearly refers to sparger 28A and column 7, lines 22-26 indicates that “36” references catalyst emptying pipes 36A, 36B, and 36C.

(Posa, col. 1, ll. 13-15; col. 2, ll. 26-30). The manifold's purpose is to precisely control the reaction gas flows to obtain multilayer structures of extremely thin layers and sharp transitions between layers (Posa, col. 1, ll. 15-18; col. 2, l. 51 to col. 3, l. 25). Thin layers with sharp transitions are achieved by a manifold that can simultaneously switch the gas flows back and forth between an outlet and a vent (Posa, col. 3, ll. 34-37).

Figure 3 of Posa, the Figure relied upon the Examiner, is reproduced below:

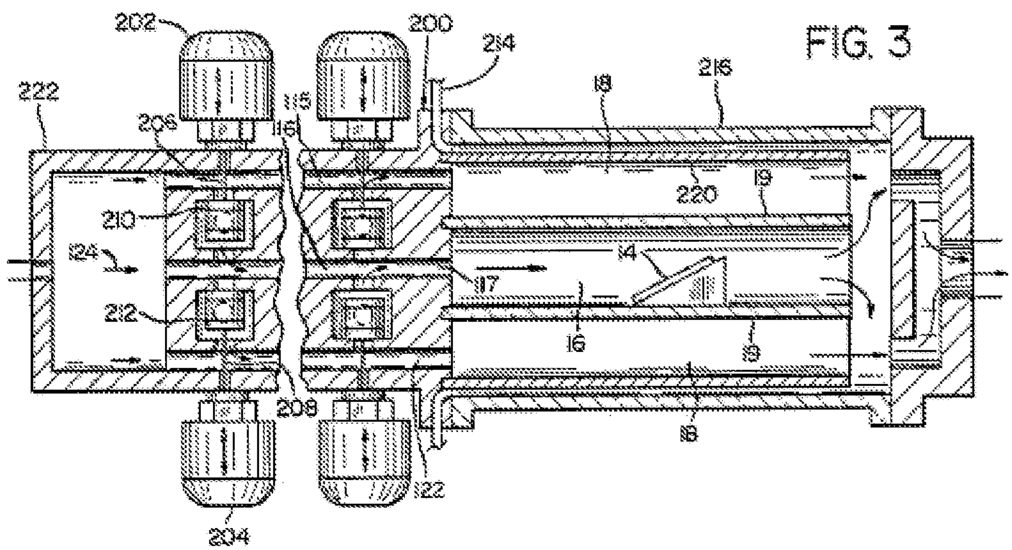


Figure 3 of Posa depicts a cross-sectional view of a gas manifold (Posa, col. 4, ll. 15-17).

The manifold of Figure 3 includes valves 202, 204. The valves are activated simultaneously to switch either the reactive gas flow or nonreactive gas flow (*see* arrows exiting valve members 210, 212) into the process chamber 16 while the other gas flows into the vent chamber 18 (Posa, col. 7, ll. 9-13). The manifold also includes a skirt purge line 214 for directing a nonreactive gas between the exterior wall 216 and the other quartz wall 220 of the vent chamber 18 (col. 7, ll. 20-23). At the other end,

the apparatus includes a common carrier manifold 222 which directs equal carrier gas flows 124 to each of the vent paths 115, 122, and the process path 116 (col. 7, ll. 26-30).

Mundt describes an apparatus inserted into a gas line of, for example, a low pressure manufacturing operation (col. 4, ll. 50-52). It is particularly constructed to help remove unwanted corrosive gases, such as chlorine and fluorine based gases, from the flow line (col. 4, ll. 53-57). It is particularly adapted for use in the semiconductor industry to remove the gaseous by-products of plasma etching and plasma assisted deposition (Mundt, col. 4, ll. 63-66). The apparatus is an effluent trap (shown as reaction chamber 18 in Figs. 1-3; col. 5, ll. 23-28), and reduces or eliminates the corrosive gases by causing the by-product gas to interact with reactant gas, a reactive element 76 (e.g., iron or zirconium mesh for chlorine and fluorine based corrosives), and a condensation element 76 upon which condenses the unwanted products (col. 8, ll. 12-54). The reaction occurs within a plasma (col. 5, l. 65 to col. 6, l. 2; col. 6, ll. 30-31, col. 8, ll. 24-31).

III. PRINCIPLES OF LAW

"[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

V. ANALYSIS

With regard to claim 1, the Examiner finds that Notman's sparger 30 is a gas port within the meaning of the claim, and acknowledges that sparger 30 is not "upstream of said outlet," but finds that Posa teaches a manifold assembly 222 including gas ports located upstream as claimed (Ans. 4-5). The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to replace Notman's gas connector (conduit 34) with Posa's gas connector (manifold 222) to add plural reactive gas source inlets to Notman's gas connector (Ans. 5).

Notman and Posa are directed to different problems and function in different ways. Notman is directed to a synthesis reactor for producing methanol or ammonia. It is designed to handle large volumes of feedstock gas. The gas is circulated within the heat exchanger 40 and pipes 26 and 42 for particular heating and cooling purposes. Posa, on the other hand, is directed to supplying gas for creating extremely thin and sharply defined layers in a chemical vapor deposition process. Posa is concerned with controlling multiple gas flows of small volume with great precision. Given the wide disparities and function, purpose, and scale between the gas apparatus of Notman and that of Posa, we agree with Appellants that the Examiner did not provide a convincing line of reasoning supporting the proposed modification (Br. 10-11).

We agree with Appellants that the Examiner reversibly erred in rejecting claim 1. The Examiner did not advance an adequate reason for replacing the gas connector (conduit 34) of Notman with the manifold assembly (222) of Posa.

With regard to claim 22, which is also rejected over Notman in view of Posa, the Examiner finds that Notman's central opening in grid plate 16A is a "first orifice" within a first partition as claimed (Ans. 18). However, claim 22 requires the first orifice have "a first central axis that is substantially aligned with the longitudinal axis of the enclosure, said first central axis being unobstructed such that gas can pass from the first chamber to the second chamber through the first central axis." In other words, claim 22 requires the orifice within the partition be open to gas passage at its very center.

Notman's plate 16A (first partition) has a central opening, but tubes 26 and 42 occupy the center of the opening to create an annular orifice through which the gas travels. Therefore, the gas of Notman passing from the first chamber to the second chamber travels only through the annular opening around the central axis. This is shown in Figure 3 (reproduced above) by the arrows arcing around gas spargers 28A. The gas does not pass from the first chamber to the second chamber "through the first central axis" as claimed because tubes 26 and 42 occupy the central axis area.

We agree with Appellants that the Examiner reversibly erred in finding that Notman describes a first orifice of the structure required by claim 22.

Turning to claim 11, the Examiner additionally relies upon Mundt along with Notman and Posa to reject this claim. Mundt describes an effluent trap inserted into the gas line of, for example, an etch apparatus. The Examiner determines that it would have been obvious to one of ordinary skill in the art to replace Mundt's process effluent abatement arrangement

(effluent trap) with Notman's catalytic gas reactor to process effluent from Mundt's etch apparatus (Ans. 8).

We cannot agree with the Examiner's reasoning. Mundt's effluent trap is designed for a low volume gas application, and uses completely different reaction means (plasma assisted reaction of corrosive gas such as chlorine and fluorine based gases with condensation) than Notman. Notman is a large scale methanol or ammonia synthesis reactor. There is simply no rational reason why one of ordinary skill in the art would employ the large scale catalytic bed reactor of Notman in the semiconductor processing system of Mundt.

We agree with Appellants that the Examiner reversibly erred in rejecting claim 11 by failing to provide a legally sufficient reason for incorporating the synthesis reactor of Notman into the apparatus of Mundt.

As all of the rejections rely upon the references in the capacity discussed above, the deficiencies discussed above affect all the rejections. There is no need to discuss McGinness as the Examiner's reliance on this reference does not cure the deficiencies discussed above.

VI. CONCLUSION

We do not sustain any of the rejections maintained by the Examiner.

VII. DECISION

The decision of the Examiner is reversed.

REVERSED

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